

1. (Amended) A soil and groundwater decontamination system for decontaminating a contaminated subsurface zone, the contaminated subsurface zone having a groundwater level below which is a groundwater (saturated) zone and above which is a vadose zone, the vadose zone and the groundwater level having a capillary fringe therebetween, comprising:

a product having the ability to react with subsurface contaminants and create a reaction end product;

A
an injection well, said injection well having a length being defined by a lateral wall, said injection well being disposed in the contaminated subsurface zone, said injection well configured to introduce said product into the contaminated subsurface zone;

a well casing having a proximal end, a distal end, a length therebetween, and a lateral wall, said distal end of said well casing being disposed in said contaminated subsurface zone;

a drop tube, said drop tube having a proximal end, a distal end, a length therebetween, and a lateral wall, said drop tube being disposed inside and extending along said well casing, said drop tube configured to extract reaction end products from the contaminated subsurface zone and contaminants from the contaminated subsurface zone; and

a vacuum pump, said vacuum pump being in fluid communication with said proximal end of said drop tube.

Sub B2
A2
5. (Amended) The soil and groundwater decontamination system of claim 1, further comprising:

~~a phase separator for separation of [liquid and gas extracted in] multiple phases extracted~~

~~through said drop tube, said multiple phases comprising [such as the] a gas phase and [the] a liquid phase, wherein said phase separator is in fluid communication with said drop tube.~~

A³ 8. (Amended) The soil and groundwater decontamination system of claim 1, further comprising:

an air supply valve, said air supply valve being variable and in fluid communication with said well casing.

Sub B4
A⁴ ~~27. (Amended) A soil and groundwater decontamination system for decontaminating a contaminated subsurface zone, the contaminated subsurface zone having a groundwater level below which is a groundwater zone and above which is a vadose zone, the vadose zone and the groundwater level having a capillary fringe therebetween, comprising:~~

~~a product supply means for introducing a product into said contaminated subsurface zone;~~

~~(a means for introducing said product) into a contaminated subsurface zone, said product being able to react with the subsurface contaminants and produce a reaction end product;~~

~~a vacuum means for creating and maintaining a vacuum in at least a portion of said system;~~

~~an extraction means for extracting a contaminant from the contaminated subsurface zone, said extraction means being in fluid communication with said vacuum means, said extraction means extracting the reaction end products from the contaminated subsurface zone and contaminants from the contaminated subsurface zone[.]; and~~

~~a fluid introducing means arranged and configured to introduce a fluid substantially adjacent and surrounding said extraction means, said extraction means being disposed within said~~

fluid introducing means.

28. (Amended) A soil and groundwater decontamination method for decontaminating a contaminated subsurface zone, the contaminated subsurface zone having a groundwater level below which is a groundwater zone and above which is a vadose zone, the vadose zone and the groundwater level having a capillary fringe therebetween, said contaminated subsurface zone having a substantially vertically oriented borehole disposed therein, said method comprising the steps of:

introducing a product into a contaminated subsurface zone, said product having the ability to react with subsurface contaminants;

allowing a reaction between said product and [to react with] said contaminants, thereby producing a reaction end product;

disposing a well casing having a proximal end and a distal end into the borehole disposed in the contaminated subsurface zone;

disposing a drop tube inside said well casing, said drop tube having a proximal end and a distal end corresponding to said proximal end and said distal end of said well casing, respectively;

producing a vacuum in said drop tube; and

extracting the reaction end product from the contaminated subsurface zone and contaminants from the contaminated subsurface zone through the drop tube.

29. (Amended) The soil and groundwater decontamination method of claim 28, further comprising the step of:

introducing a catalyst into a contaminated subsurface zone, said catalyst facilitating [a] said reaction between the product and contaminants in the contaminated subsurface zone.

30. (Amended) The soil and groundwater decontamination method of claim 29, wherein said steps of introducing a catalyst and introducing a product are implemented [done] simultaneously.

31. (Amended) The soil and groundwater decontamination method of claim 29, wherein said step of introducing a catalyst is implemented [done] before the step of introducing a product.

32. (Amended) The soil and groundwater decontamination method of claim 29, wherein said step of introducing a catalyst is implemented [done] after the step of introducing a product.

33. (Amended) The soil and groundwater decontamination system of claim 28, further comprising the step of:

separating liquid and gas being extracted simultaneously in a common stream through said drop tube [multiple phases, such as the gas phase and the liquid phase].

A⁷ 35. (Amended) The soil and groundwater decontamination system of claim 28, further comprising the step of:

supplying an amount of fluid to said well casing, said amount of [step of supplying] fluid being variable.

48. (Amended) The soil and groundwater decontamination method of claim 28, wherein said step of allowing a reaction [said product to react] and said step of producing a vacuum are implemented [done] simultaneously.

A⁸ 49. (Amended) The soil and groundwater decontamination method of claim 28, wherein said step of allowing a reaction [said product to react] is implemented [done] before said step of producing a vacuum.

50. (Amended) The soil and groundwater decontamination method of claim 28, wherein said step of allowing a reaction [said product to react] is implemented [done] after said step of producing a vacuum.

IN THE DRAWINGS

Figure 1 has been amended to illustrate a separator as well as the ends of the injection well, the well casing and the drop tube as being disposed in the vadose zone or at the groundwater level. Pursuant to 37 C.F.R. §1.123, a marked-up copy of the originally filed drawings is included with the present response which shows the necessary changes in red ink.